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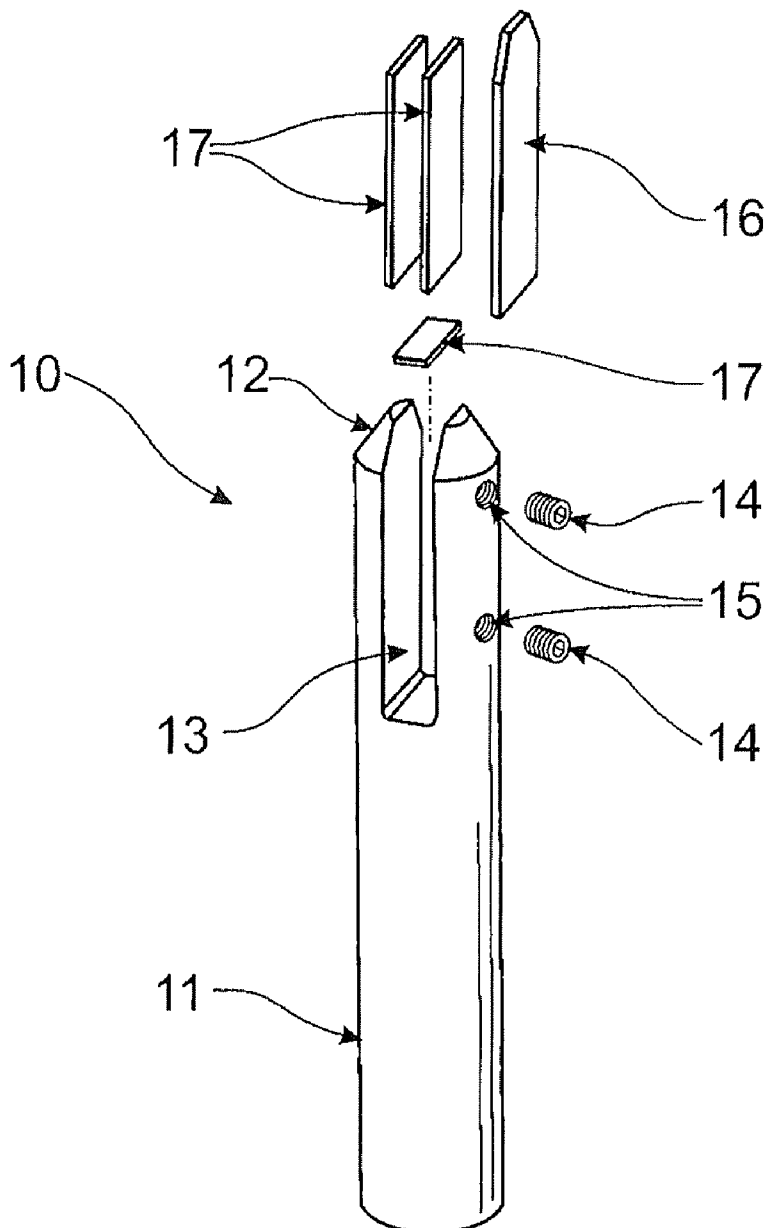
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(57) **ABSTRACT**

A clamp has a body including an open-ended slot to receive and retain a planar object. The slot includes a protective layer of deformable material and a force distribution plate of rigid material located between an internal wall of the slot and the protective layer. The planar object need not include attachment apertures, and may be made of glass.

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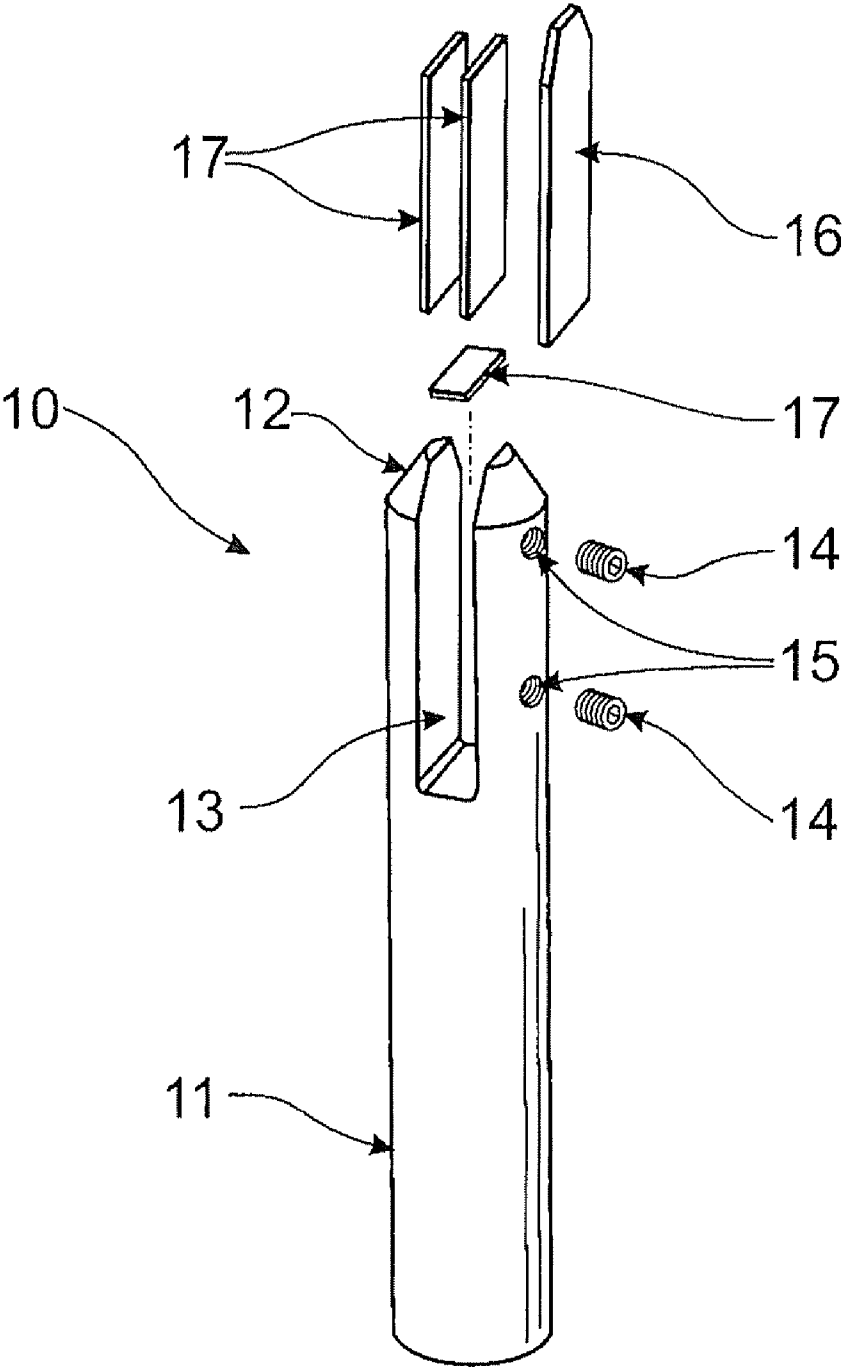


FIG. 1

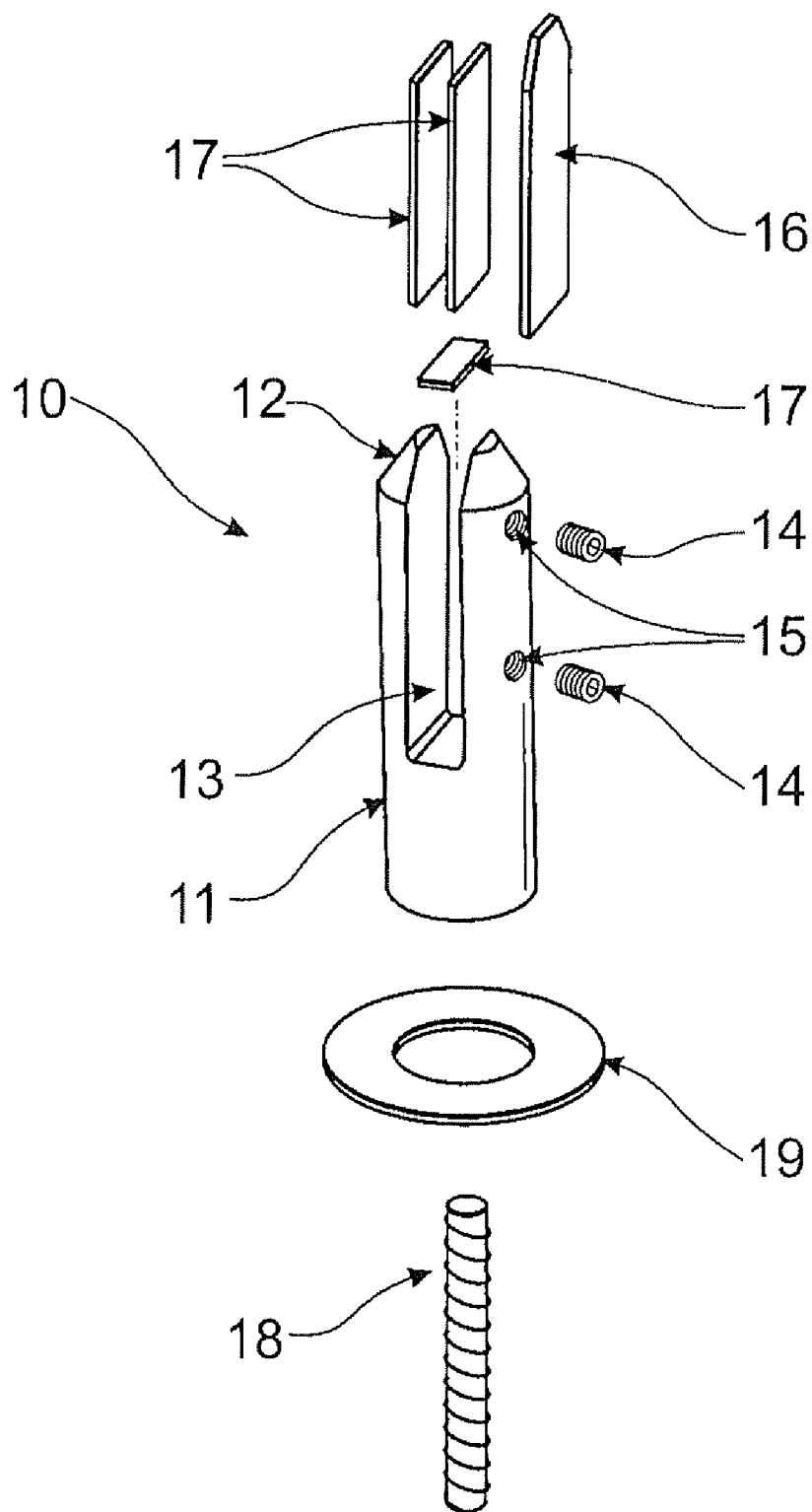


FIG. 2

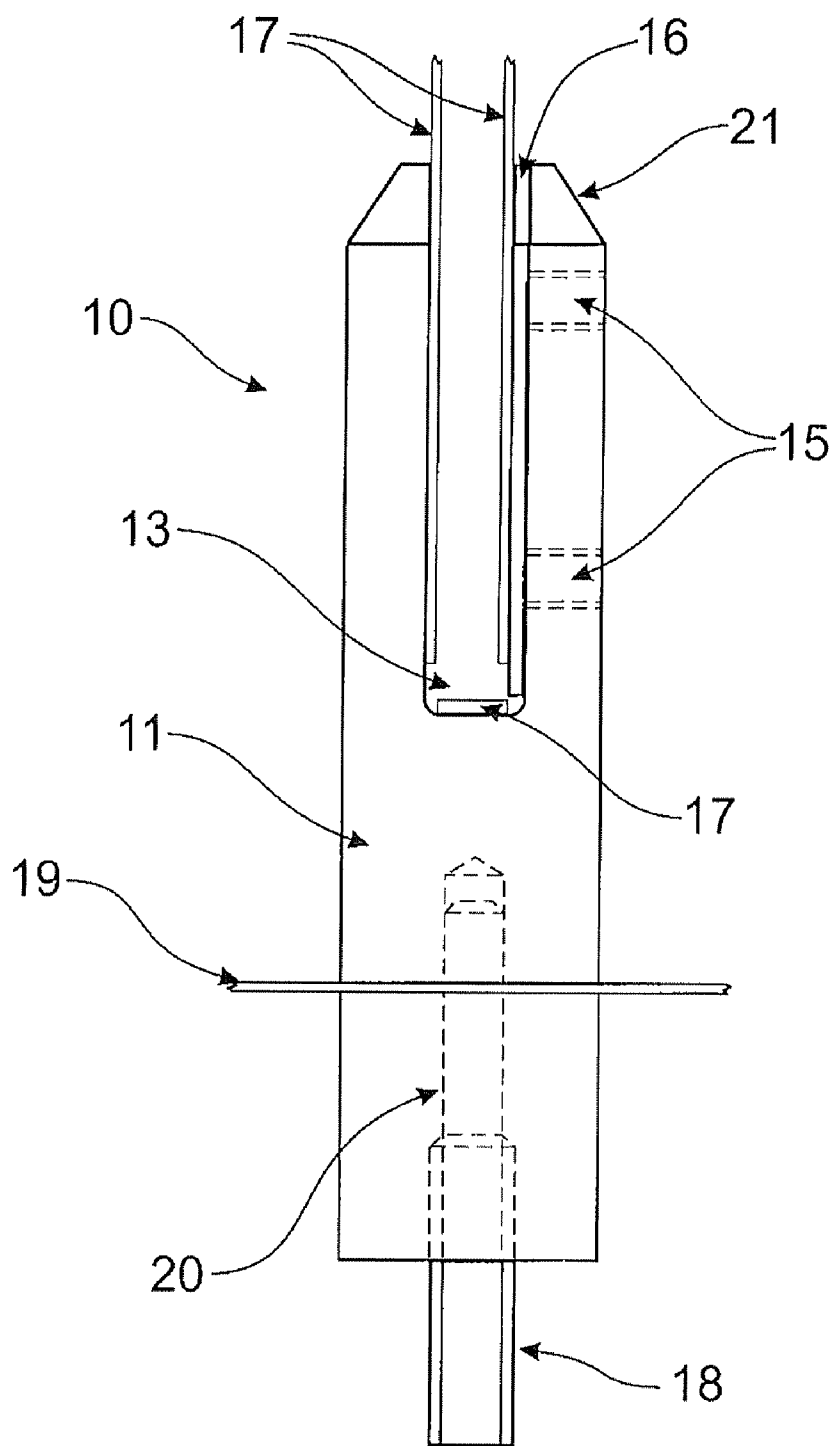


FIG. 3

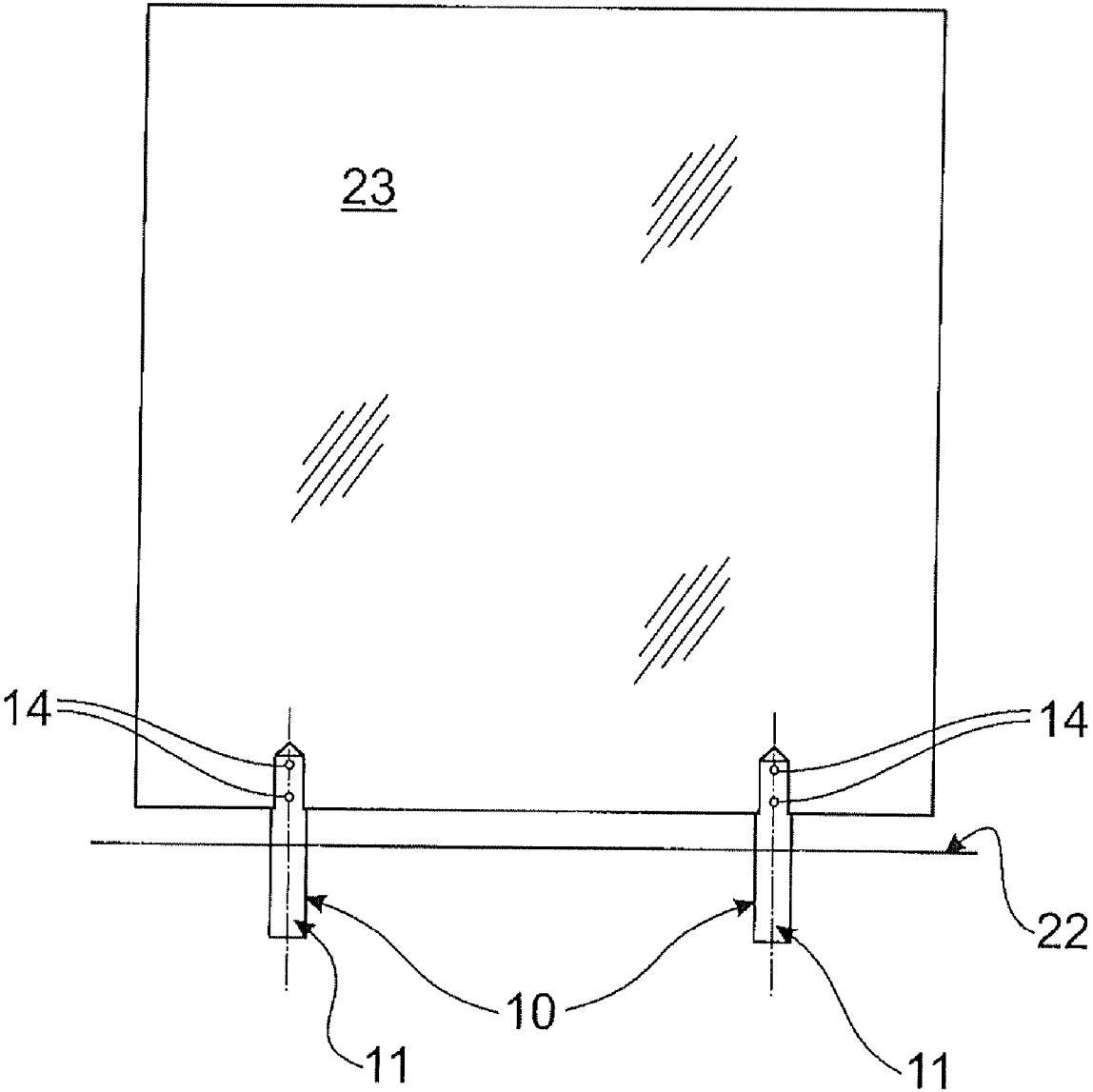


FIG. 4

**CLAMP**

## FIELD OF THE INVENTION

[0001] The present invention relates to a clamp. In particular, the present invention relates to a clamp for a planar object, such as a glass panel.

## BACKGROUND ART

[0002] Panels are often used for fencing (such as pool fencing), decorative screens, noise barriers and the like.

[0003] When panels are constructed from wood or metal and the like, retaining the panels in place is a simple matter of fixing the panel to a support using a screw, bolt, nail and so on passed through the panel itself. However, when glass panels are used, drilling holes into the glass is not recommended for a number of reasons. Firstly, glass panels, particularly those provided with decorative patterns, etching etc, can be very expensive, and drilling holes into this type of panel not only affects the aesthetics of the panel but also risks breaking the panel during the drilling process. Furthermore, drilling a hole in a glass panel results in a weak point in the panel at which mechanical stresses accumulate. This could lead to the panel cracking or breaking when in use.

[0004] In order to avoid this kind of damage, glass panels are often held in place using clamps that allow the panel to be retained in place without damaging the surface of the panel. Since excessive movement of the glass panel would result in it cracking or breaking, clamps for glass panels must themselves be held fixedly in place. Typically, this has been achieved by fixedly attaching the clamps to a solid substrate, such as concrete. However, the necessity of attaching the clamps to a solid substrate severely limits the applications in which glass panels may be used as barriers.

[0005] Therefore, there would be an advantage if it were possible to provide a clamp which allowed glass panels to be used in a wide variety of locations while simultaneously assisting in preventing damage to the glass panel.

[0006] It will be clearly understood that, if a prior art publication is referred to herein, this reference does not constitute an admission that the publication forms part of the common general knowledge in the art in Australia or in any other country.

[0007] Throughout this specification, the term "comprising" and its grammatical equivalents shall be taken to have an inclusive meaning unless the context of use indicates otherwise.

## OBJECT OF THE INVENTION

[0008] It is an object of the present invention to provide a clamp which may overcome at least some of the abovementioned disadvantages, or provide a useful or commercial choice.

[0009] This invention provides a clamp for a planar object, the clamp comprising a body, said body including at least one planar open ended slot adapted to receive and retain the planar object therein, said slot also including a protective layer of material made from rubber or similar deformable material, as well as at least one force distribution plate made from rigid material which is located between an internal wall of the slot and the protective layer of material, there also being provided securing means for securing the planar object within the slot in use, said securing means contacting the force distribution plate in use to retain the planar object within the protective

layer of material, whereby the planar object does not incorporate attachment apertures and thus comprises a continuous sheet of material such as glass. While the clamp may be used to clamp any suitable planar object, it is preferred that the clamp is used with planar objects in the form of sheets of glass.

[0010] Preferably, the clamp further comprises attachment means, the attachment means adapted to connect the clamp to suitable anchor means in order to prevent movement of the clamp when in use. The clamp may be connected to the anchor means in a fixed or removable engagement.

[0011] The attachment means may comprise any suitable means. However, it is preferred that the attachment means allows the clamp to be connected to anchor means under a wide variety of ground conditions, not just conditions in which the clamp is attached to a solid substrate (such as concrete).

[0012] In some embodiments of the present invention, the attachment means comprises a bore. The bore may be located in a lower end of the body of the clamp. In one embodiment of the invention, the bore may be located through a lower surface of the clamp and extend partially through the body. Preferably, the bore is oriented so as to extend substantially coaxially with a central axis through the cylindrical body of the clamp.

[0013] The anchor means may be of any suitable form, such as, but not limited to, a projection, such as a rod, adapted to be retained within the bore of the clamp. The projection may be screw threaded. In this embodiment of the invention, the bore may be provided with a complimentary screw thread adapted to retain the projection in the bore in a screw-threaded engagement. The anchor means may be fixed into the ground under any suitable ground conditions, either where there is a stable substrate (such as a concrete slab or wooden floor, for instance) or under less stable conditions (directly into soil, submerged in water etc).

[0014] In some embodiments of the invention, at least a portion of the clamp may be located below the surface of the substrate or the ground to which it is connected when in use. In these embodiments of the invention, the clamp may be provided with one or more plates through which the cylindrical body of the clamp may pass. The one or more plates are adapted to be retained at, for instance, ground level, when the clamp is in use.

[0015] The body of the clamp may be of any suitable dimensions and configuration. However, it is preferred that the body of the clamp is constructed so as to be substantially cylindrical. More preferably, the substantially cylindrical body comprises a solid member. By constructing the body of the clamp as a solid cylinder, the clamp is heavier and therefore more rigid and less likely to deform under conditions of strong wind and the like. By reducing the likelihood of movement of the clamp, the chance of a glass panel breaking due to movement of the clamp is significantly reduced. In some embodiments of the invention, the body of the clamp is constructed from a high-strength, corrosion resistant material, such as stainless steel. A high-strength, corrosion resistant material is preferred so as to ensure that the clamp has a long service life and can be used under a wide variety of climatic conditions and in a wide variety of duties.

[0016] The body of the clamp may also include a tapered portion at an upper end of the body of the clamp which may be provided with any suitable incline. However, it is preferred that the incline on the inclined surface of the tapered portion

is between about 40° and 80°, more preferably between about 50° and 70°, and still more preferably between about 55° and 65° to the vertical. At these inclinations, the inclined surface of the tapered portion is angled so as to prevent a person, such as a child, from being able to get a climbing toehold on the clamp in order to climb the glass panel. This is of particular importance when, for instance, the glass panels retained by the clamp are being used as pool fencing and the like.

**[0017]** While the cross-sectional shape of the tapered portion may be of any suitable configuration, it is preferred that the cross-sectional shape of the tapered portion is frusto-conical.

**[0018]** The open ended slot of the clamp adapted to receive a planar object may be of any suitable configuration. The term "slot" as used herein may include a slot, channel, recess or the like into which an edge of the planar object may be inserted. Preferably, the slot extends downwardly into the body of the clamp from an upper surface of the clamp. It is preferred that the slot extends a sufficient distance into the body of the clamp to ensure that a planar object may be retained firmly and securely in the slot.

**[0019]** Once received in the slot, the planar object may be retained in place through the use of one or more securing means. The securing means may comprise any suitable form. However, in a preferred embodiment of the invention, the securing means comprise one or more elongate fasteners inclusive of screws, such as grub screws, which may be tightened adjacent a proximal surface of the planar object to secure the planar object within the slot. In a preferred embodiment of the invention, the clamp comprises two grub screws.

**[0020]** Preferably, the securing means may extend at least partially into the slot through a wall of the body. The securing means may extend partially through the wall, or may extend entirely through the wall of the body. In a preferred embodiment of the invention, the securing means are located in one or more bores extending perpendicular to a central axis through the body of the clamp. The securing means may be situated such that a head of a grub screw is accessible to the outside of the clamp, while the other end of the grub screw extends at least partially into the slot during use. Thus, when the user wishes to clamp a planar object within the slot, the head of the grub screw is accessible for tightening, thereby clamping the other end of the grub screw against the adjacent surface of the planar object. Similarly, when a user wishes to remove a planar object from a clamp the head of the grub screw is accessible for the user to loosen the grub screw thereby releasing the planar object for removal from the slot.

**[0021]** It is preferred that the protective layer of material is constructed from a material that will not damage the surface of the planar object when in contact with the planar object. Additionally, it is preferred that the protective material is constructed from a material that will not be damaged by the action of the securing means on the protective layer. Therefore, the protective layer is constructed from rubber or a similar deformable material.

**[0022]** The clamp may further be provided with one or more force distribution plates in abutment with the protective layer of material. The force distribution plate(s) or pressure plate(s) may be adapted to spread the pressure created by the tightening of the securing means across a relatively wide area of the planar object. In this way, the pressure created by the tightening of the securing means is not concentrated at one or more points on the surface of the planar object, a situation which could lead to damage to the planar object. The term

"force distribution plate" therefore has this meaning herein. Preferably, the plate(s) are made from a rigid material, such as steel or some other metal.

**[0023]** The force distribution plate(s) are positioned between an internal wall of the slot and the protective layer of material such that the force created by the tightening of the securing means is distributed across the adjacent surface of a respective force distribution plate, which in turn exerts a force on the protective layer without any localised pressure points.

**[0024]** In some embodiments of the invention the clamp comprises a pair of force distribution plate(s), one located against each internal wall of the slot. However, it is preferred that only a single force distribution plate be utilised.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0025]** An embodiment of the invention will be described with reference to the following drawings in which:

**[0026]** FIG. 1 illustrates a perspective view of a clamp according to an embodiment of the present invention;

**[0027]** FIG. 2 illustrates a perspective view of a clamp according to an embodiment of the present invention;

**[0028]** FIG. 3 illustrates a side view of a clamp according to an embodiment of the present invention;

**[0029]** FIG. 4 illustrates clamps according to an embodiment of the present invention in use.

#### DETAILED DESCRIPTION OF THE DRAWINGS

**[0030]** It will be appreciated that the drawings have been provided for the purposes of illustrating preferred embodiments of the present invention and that the invention should not be considered to be limited solely to the features as shown in the drawings.

**[0031]** In FIG. 1 there is illustrated a clamp **10** according to an embodiment of the present invention. The clamp **10** comprises a solid cylindrical body **11** with a tapered portion **12** at the upper end of the body **11**. The upper end of the body **11** comprises a slot **13** into which a planar object (not shown), such as a pane of glass may be received and retained. When a planar object (not shown) is received in the slot **13**, the planar object (not shown) may be retained in the slot **13** by tightening securing means in the form of a pair of grub screws **14**. The grub screws **14** pass through corresponding bores **15** that extend through the outer wall of the body **11** and into the slot **13**.

**[0032]** Tightening of the grub screws **14** exerts pressure on the force distribution plate **16**. The force distribution plate **16** spreads the pressure applied by the grub screws **14** across the surface of the plate **16** meaning that no pressure points are created that could damage the surface of the planar object (not shown). In use, the force distribution plate **16** is sandwiched between the securing means **14** and the protective layer of deformable material **17**.

**[0033]** In the embodiment of the invention illustrated in FIG. 1, the protective layer **17** comprises two vertical pieces and a separate intermediate horizontal piece. However, the skilled addressee will understand that the protective layer **17** could also be constructed in two sections, or as a single piece.

**[0034]** In use, the planar object (not shown) is received in the substantially U-shaped channel formed by the protective layer **17**. In this way, when in the slot **13**, no part of the planar object (not shown) is in direct contact with the body **11** of the clamp, ensuring that the likelihood of damage to the planar object (not shown) is reduced.

[0035] Turning now to FIG. 2 there is shown an alternative embodiment of the clamp 10 of the present invention. The clamp 10 comprises a solid cylindrical body 11 with a tapered portion 12 at an upper end of the body 11. The body 11 of the clamp 10 includes a slot 13 adapted to receive a planar object, such as a glass panel (not shown). A glass panel (not shown) may be retained within the slot 13 by tightening a pair of grub screws 14 against the glass panel (not shown). The grub screws 14 pass through corresponding bores 15 that extend through the outer wall of the body 11 and into the slot 13.

[0036] Tightening of the grub screws 14 exerts pressure on the force distribution plate 16. The force distribution plate 16 spreads the pressure applied by the grub screws 14 across the surface of the plate 16 meaning that no pressure points are created that could damage the surface of the planar object (not shown). In use, the force distribution plate 16 is sandwiched between the securing means 14 and the protective layer 17.

[0037] In the embodiment of the invention illustrated in FIG. 2, the protective layer 17 comprises two vertical pieces and a separate intermediate horizontal piece. However, the skilled addressee will understand that the protective layer 17 could also be constructed in two sections, or as a single piece.

[0038] The clamp 10 of FIG. 2 further comprises a bore (obscured) extending through the lower surface of the body 11 and extends partially through the body 11. The bore (obscured) may be provided with a screw thread so that the clamp 10 may be retained on an anchor in the form of a screw threaded rod 18 anchored in the ground or in a substrate such as a concrete pad (not shown).

[0039] The clamp 10 also includes a plate 19. The plate 19 is adapted such that the body 11 of the clamp 10 may pass therethrough. The plate 19 is adapted to be retained at ground level or on the surface of a substrate when the clamp 10 is in use.

[0040] In FIG. 3 a partial cross-section of the clamp 10 according to an embodiment of the present invention is shown. The body 11 of the clamp 10 comprises a bore 20 through the lower surface of the body 11 and extending partially through the body 11. The bore 20 may be provided with an internal screw-thread adapted for engagement with anchor means in the form of a screw-threaded rod 18, such that the clamp 10 may be retained on the rod 18. The rod 18 is typically anchored in the ground or in a substrate such as a concrete pad (not shown). The clamp 10 includes a plate 19, the plate 19 adapted to be retained at ground level when the clamp 10 is in use.

[0041] In FIG. 3 the bores 15 for the grub screws (not shown) may be clearly seen. Tightening of the grub screws (not shown) exerts pressure on the pressure distribution plate 16 located within the slot 13 in the body 11. The protective layer 17 is also located within the slot 13.

[0042] The tapered portion 12 at the upper end of the body 11 may also be clearly seen in FIG. 3. In this embodiment of the invention, the inclined surface 21 of the tapered portion 12 is provided at an angle of about 60° to the vertical in order to prevent children, for instance, from obtaining a toehold when climbing on the clamp 10. It will be noted in FIG. 3 that the glass panel 23 does not include any attachment apertures or fixing holes.

[0043] Turning to FIG. 4 there is shown a pair of clamps 10 according to an embodiment of the present invention when in use. The clamps 10 are positioned such that a portion of the body 11 of each clamp 10 is located beneath ground level 22. The glass panel 23 is retained by the clamps 10 by tightening grub screws 14 which exert a pressure on the planar object 23 of sufficient magnitude to retain the planar object 23 fixedly in place. The glass panel 23 does not include any attachment apertures or fixing holes as shown.

[0044] Those skilled in the art will appreciate that the present invention may be susceptible to variations and modifications other than those specifically described. It will be understood that the present invention encompasses all such variations and modifications that fall within its spirit and scope.

1. A clamp for a planar object, the clamp comprising a body, said body including at least one open ended slot adapted to receive and retain the planar object therein, the slot also including a protective layer of material made from rubber or similar deformable material, as well as at least one force distribution plate made from rigid material which is located between an internal wall of the slot and the protective layer of material, there also being provided securing means for securing the planar object within the slot in use, said securing means contacting the force distribution plate in use to retain the planar object within the protective layer of material, whereby in use the planar object does not incorporate attachment apertures and thus comprises a continuous sheet of material such as glass.

2. A clamp as claimed in claim 1 wherein there is only provided a single force distribution plate.

3. A clamp as claimed in claim 1, wherein the securing means includes one or more grub screws or elongate fasteners extending through aligned openings in the body of the clamp and abutting an adjacent surface of the force distribution plate.

4. A clamp as claimed in claim 1, wherein the body of the clamp comprises an elongate post having a solid lower part which may incorporate an axial base therewithin and a top part which incorporates said at least one open ended slot.

5. An assembly of a clamp and a glass panel, which is a continuous sheet of glass not incorporating any attachment apertures, the clamp comprising an elongate body having a top open ended slot, the slot further including a protective layer of material made from rubber or similar deformable material as well as a single force distribution plate made from rigid material such as steel, which is located between an internal side wall of the slot and the protective layer of material, said glass panel being received within the protective layer of material and thus having each side or broad surface thereof being cushioned by the protective layer of material, there also being included securing means in the form of grub screws or elongate fasteners which extend through openings in the elongate body of the clamp and contacting the force distribution plate.

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